WHAT IS CLAIMED IS:

1. A method for constructing a recombinant gene encoding a single-chain variable fragment antibody cloned into an expression vector and fused with a streptavidin-binding peptide (SBP) gene sequence to produce a fusion protein, comprising:

(a) encoding anti-VEE single-chain variable fragment antibody (scFv Ab) gene to a recombinant plasmid and inserting a SBP gene and a 6His tag downstream to develop a SBP tagged scFv Ab construct;

(b) amplifying the resultant scFv/SBP/6His by polymerase chain reaction (PCR);

(c) inserting the amplified PCR products into cloning vector to produce a SBP-plasmid;

(d) constructing said SBP-plasmid with promoter to produce a SBP tagged scFv Ab; and

(e) expressing said SBP tagged scFv Ab in *E. coli* cells as inclusion bodies and purifying the expressed SBP tagged scFv Ab by immobilized metal affinity chromatography.

2. A method as in claim 1, wherein:

- said recombinant plasmid in step (a) is a pPICZαBmA116 recombinant plasmid;
- said cloning vector in step (c) is pCRT7 TA; and
- said promoter in step (d) is a T7 promoter.

3. A method as in claim 1, wherein said anti-VEE scFv Ab is mA116 Ab.

4. A fusion protein, SBP tagged scFv Ab, comprising a single-chain variable fragment antibody (scFv Ab) fused with a streptavidin-binding peptide (SBP) sequence.

5. The SBP tagged recombinant scFv Ab fusion protein of claim 4, comprising an amino acid sequence encoded by the nucleotide sequence shown in SEQ ID NO.: 1.

6. The SBP tagged recombinant scFv Ab fusion protein of claim 4, comprising the amino acid sequence shown in SEQ ID NO.: 2.

7. The SBP tagged recombinant scFv Ab fusion protein of claim 4, wherein said fusion protein has a molecular weight of ~32 kDa.

8. The SBP tagged recombinant scFv Ab fusion protein of claim 4, wherein said fusion protein displays high antigen-binding affinity to Venezuelan equine encephalitis virus (VEE).

9. The SBP tagged recombinant scFv Ab fusion protein of claim 4, wherein said fusion protein displays high streptavidin-binding activity.

10. The SBP tagged recombinant scFv Ab fusion protein of claim 4, wherein said scFv Ab is mA116 scFv Ab.

11. A method for using the SBP tagged recombinant scFv Ab fusion protein of claim 4 for detecting VEE, comprising:

(a) reacting the SBP tagged scFv Ab with a sample containing VEE for observing antigen-binding activity; and

(b) analyzing the reactant by enzyme-linked immunosorbent assay (ELISA).

12. The method of claim 11, wherein said ELISA immunoassay employs an indicator enzyme and substrate system to visually indicate presence of antigen-binding activity.

13. The method of claim 12, wherein horseradish peroxidase is used in said ELISA as the indicator enzyme.

14. The method of claim 12, wherein 2,2'-azino-di-(3-ethyl-benzthiazoline-sulfonic acid) diammonium salt (ABTS) is used in said ELISA as the substrate system.

15. The method of claim 11, wherein said scFv Ab is mA116 scFv Ab.